

1                                    ASSEMBLY FOR A HYDRAULIC DASHPOT

2    The present invention concerns an assembly for a hydraulic  
3    dashpot. The dashpot is accommodated in a housing that is  
4    partitioned into two compartments by a shock-absorbing piston  
5    mounted on one end of a piston rod and accordingly traveling back  
6    and forth inside the housing. Dashpots of this genus can be solid  
7    walled or hollow-walled. The shock-absorbing piston is  
8    transversed by fluid-conveying channels provided with stacks of  
9    cupsprings that open and close to control the flow in both the  
10   vacuum phase and the pressure phase.

11  
12   Low-amplitude oscillations sometimes reach the piston rod and  
13   break the cupsprings loose, leading to irregular shock  
14   absorption. European Patent 1 152 166 A1 proposes counteracting  
15   this tendency using another, vibration-compensating, piston  
16   hydraulically paralleling the shock-absorbing piston but  
17   accommodated in a subsidiary housing. The vibration-compensating  
18   piston in one embodiment is mounted on the face of the shock-  
19   absorbing piston more remote from the piston rod. There is a  
20   drawback here in that rod's radial moment of support is too  
21   short. In one alternative embodiment, the vibration-compensating  
22   piston is mounted in an adaptor between the end of the piston rod  
23   and the shock-absorbing piston. Here again there are drawbacks--  
24   the design is complicated and the shock-absorbing piston is of  
25   course not as rigidly fastened to the piston rod.

1 The object of the present invention is to eliminate the drawbacks  
2 inherent in the state of the art described in the forgoing and to  
3 improve the design and position of the vibration-compensating  
4 piston, ensuring a solid and reliable connection between the  
5 shock-absorbing piston and the piston rod while allowing as much  
6 of the piston rod as possible to find support inside the housing.

7  
8 This object is attained in accordance with the present invention  
9 in an assembly of the aforesaid genus by the characteristics  
10 recited in Claim 1. This embodiment has several advantages.  
11 Specifically, a vibration-compensating piston accommodated in a  
12 subsidiary housing can be simple in design and simple to install  
13 at the end of the piston rod upstream of the shock-absorbing  
14 piston, allowing the greatest possible radial support for the  
15 piston rod against the housing by way of the shock-absorbing  
16 piston.

17  
18 Practical alternative and advanced embodiments of the present  
19 invention are recited in Claims 2 through 7.

20  
21 One embodiment of the present invention will now be specified  
22 with reference to the accompanying drawing.

23  
24 The sole figure represents a cross-section through the dashpot at  
25 the end of the piston rod.

1 The dashpot is provided with an overall housing 1 with a solid  
2 cap at one end and a cap perforated by a central bore at the  
3 other, and is full of shock-absorbing fluid. A piston rod 2  
4 travels into and out of the housing through the bore.  
5  
6 A shock-absorbing piston 3 is mounted on the end of piston rod 2  
7 and slides back and forth against the inner surface of housing 1.  
8 A cuff 4 of low-friction material seals shock-absorbing piston 3  
9 off from housing 1.  
10  
11 Breaches 5 allow the fluid to flow through shock-absorbing piston  
12 3 and are individually closed off on one face by a stack of  
13 cupsprings 6. Depending on the direction being traveled by piston  
14 rod 2, cupsprings 6 either act as checkvalves or determine the  
15 level of shock absorption in accordance with how rapidly the  
16 fluid is flowing through breaches 5.  
17  
18 Shock-absorbing piston 3 is mounted around a bolt 7 at one end of  
19 piston rod 2 and secured there by a nut 8.  
20  
21 The section 9 of piston rod 2 adjacent to bolt 7 is wider than  
22 the bolt. A subsidiary housing 10 is mounted around section 9  
23 before shock-absorbing piston 3 is introduced. Subsidiary housing  
24 10 accommodates an annular piston 11, which it must accordingly  
25 be sectional to accept, a characteristic not illustrated in the

1 drawing.

2

3 Subsidiary housing 10 is cylindrical, each base being provided  
4 with a central bore, slightly wider in the illustrated example  
5 than section 9 of piston rod 2. Accommodated in these bores are  
6 seals 12 and 13. The edges of seals 12 and 13 are provided with  
7 flanges 14 and 15 that radially overlap the upper and lower  
8 surfaces of housing 10, sealing it off radially from section 9.  
9 Flanges 14 and 15 rest radially against piston rod 2 at the top  
10 and against a gasket 16 interposed between shock-absorbing piston  
11 3 and housing 10 at the bottom. Tolerances can be compensated by  
12 the resilience of flanges 14 and 15.

13

14 Annular piston 11 travels back and forth axially inside  
15 subsidiary housing 10 and is radially sealed off against section  
16 9 of the piston rod and against the inner surface of the housing.  
17 The space 17 accordingly created at the top of housing 10  
18 communicates hydraulically with the dashpot's upper shock-  
19 absorption compartment 19 by way of bores 18. The lower shock-  
20 absorption compartment 20 communicates hydraulically with the  
21 space 23 at the bottom of housing 10 by way of transverse bores  
22 21 and of a longitudinal bore 22 through the axis of the piston  
23 rod. As piston rod 2 oscillates at low amplitudes in relation to  
24 overall housing 1, annular piston 11 will travel back and forth  
25 axially inside subsidiary housing 10 without lifting cupsprings 6

1 off of breaches 5.

2

3 Since the axial motion of annular piston 11 is limited by the  
4 length of subsidiary housing 10, the magnitude of the amplitudes  
5 that can be handled by the vibration-compensating piston is also  
6 limited. The flanges 24 and 25, resting against the inner surface  
7 of subsidiary housing 10, of seals 12 and 13 can be of flexible  
8 plastic to cushion the impact of annular piston 11 against the  
9 base of subsidiary housing 10.

10

11 The annular piston 11 in the illustrated embodiment is in two  
12 identically shaped halves that rest together face to face. The  
13 piston travels along the inner surface of subsidiary housing 10  
14 sealed tight by a centering-and-sealing cuff 26. Cuff 26 is  
15 subject to tension applied by an O ring 27 that can also help  
16 keep the components of annular piston 11 together, although the  
17 same task can be otherwise performed. Annular piston 11 is sealed  
18 off against section 9 of the piston rod by a two-part seal  
19 comprising a loosely sliding ring 28 and another O ring 29.

20

21 The circumference of section 9 need not, as illustrated, be  
22 graduated down to the circumference of bolt 7 or piston rod 2. It  
23 can also equal these circumferences.

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